

PATENT APPLICATION TRANSMITTAL LETTER

ATTORNEY'S DOCKET NO.

T- 2988

TO THE COMMISSIONER OF PATENTS AND TRADEMARKS:

Transmitted herewith for filing is the patent application of Curtis C. Shoup

for METHOD OF FABRICATING SECURITY DOOR AND STRUCTURE THEREOF

Enclosed are:

- ☒ 4 sheets of drawing. (informal)
- ☒ an assignment of the invention to Columbia Manufacturing Corporation
14400 South San Pedro Street, Gardena, CA 90248
- ☐ a certified copy of a _____ application.
- ☐ associate power of attorney.
- ☒ verified statement to establish small entity status under 37 CFR 1.0 and 1.27. _____

CLAIMS AS FILED

SMALL ENTITY

OTHER THAN A SMALL ENTITY

FOR	NO FILED	NO EXTRA
BASIC FEE		
TOTAL CLAIMS	20 20	* -0-
INDEP CLAIMS	4 3	* 41.00
MULTIPLE DEPENDENT CLAIM PRESENT		

RATE	FEE
	\$395.00
* 0	\$ -0-
* 10	\$ 41.00
10	\$
TOTAL	\$436.00

OR

OR

OR

OR

OR

OR

RATE	FEE
	\$300
* 10	\$
* 30	\$
* 100	\$
TOTAL	\$

* If the difference in rate 1 is less than zero enter 0 in col 2

☐ Please charge my Deposit Account No. _____ in the amount of \$ _____.

☐ A duplicate copy of this sheet is enclosed.
and assignment recordation fee

☒ A check in the amount of \$ 476.00 to cover the filing fee is enclosed.

☒ The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 03-2035. A Duplicate copy of this sheet is enclosed.

☒ Any additional filing fees required under 37 CFR 1.16.

☐ Any patent application processing fees under 37 CFR 1.17

☐ The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to Deposit Account No. _____. A duplicate copy of this sheet is enclosed.

☐ Any filing fees under 37 CFR 1.16 for presentation of extra claims.

☐ Any patent application processing fees under 37 CFR 1.17.

☐ The issue fee set in 37 CFR 1.16 at or before mailing of the Notice of Allowance, pursuant to 37 CFR 1.211(b).

November 20, 1997

date

Charles H. Thomas
signature Charles H. Thomas Reg. No. 25,710

Patent and Trademark Office - U.S. DEPARTMENT OF COMMERCE

656030 TEE5650

66/03/99
Jc553 U.S. PTO

201.06(a)

MANUAL OF PATENT EXAMINING PROCEDURE

PTO/SB/13 (11-96)

Approved for use through 6/30/99, OMB 0651-0033
Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

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66/03/99
Jc490 U.S. PTO
09/325311

REQUEST FOR FILING A PATENT APPLICATION UNDER 37 CFR 1.60

DOCKET NUMBER	ANTICIPATED CLASSIFICATION OF THIS APPLICATION		PRIOR APPLICATION EXAMINER	ART UNIT
	CLASS	SUBCLASS		
T-3335	49	469.5	Jennifer I. Thissell	3635

Address to:
Assistant Commissioner for Patents
Washington, D.C. 20231

This is a request for filing a ☐ continuation ☒ divisional application under 37 CFR 1.60, of pending prior Application Number 08/976,763, filed on 11/24/97 entitled Method of Fabricating Security Door and Structure Thereof

1. Enclosed is a copy of the latest inventor-signed prior application, including a copy of the oath or declaration showing the original signature or an indication it was signed. I hereby verify that the papers are a true copy of the latest signed prior application number 08/976,763, and further that all statements made herein of my own knowledge are true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

CLAIMS	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
TOTAL CLAIMS (37 CFR 1.16(c))		20 - 20 =	0	x \$18.00	\$
INDEPENDENT CLAIMS (37 CFR 1.16(d))		3 - 3 =	0	x \$78.00	
MULTIPLE DEPENDENT CLAIMS (if applicable) (37 CFR 1.16(d))				+ \$	=
				BASIC FEE (37 CFR 1.16(a))	+ \$760.00
				Total of above Calculations =	\$760.00
				Reduction by 50% for filing by small entity (Note 37 CFR 1.9, 1.27, 1.28).	-\$380.00
				TOTAL =	\$380.00

2. ☒ A verified statement to establish small entity status under 37 CFR 1.9 and 1.27
☐ is enclosed.
☒ was filed in prior application number 08/976,763 and such status is still proper and desired (37 CFR 1.28(a)).
3. ☒ The Commissioner is hereby authorized to charge any fees which may be required under 37 CFR 1.16 and 1.17, or credit any overpayment to Deposit Account No. 032035. A duplicate copy of this sheet is enclosed.
4. ☒ A check in the amount of \$ 380.00 is enclosed.
5. ☒ Cancel in this application original claims 18-20 of the prior application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)
6. ☒ The inventor(s) of the invention being claimed in this application is (are): Curtis C. Shoup
7. ☐ This application is being filed by less than all the inventors named in the prior application. In accordance with 37 CFR 1.60(b), the Commissioner is requested to delete the name(s) of the following person or persons who are not inventors of the invention being claimed in this application:
8. ☒ Amend the specification by inserting before the first line the sentence: "This application is a ☐ continuation ☒ division of application number 08/976,763, filed 11/24/97, (status: ~~abandoned~~, pending, etc.)."

[Page 1 of 2]

Burden Hour Statement: This form is estimated to take 0.5 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

I hereby certify that the enclosed DIVISIONAL APPLICATION is being deposited in the U. S. Postal Service as express mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on

200 - 22

JUNE 3, 1999
Charles H. Thomas
Charles H. Thomas
Express Mail No. ET 25655995 US

PTO/SB/13 (11-96)

Approved for use through 6/30/99. OMB 0651-0033

Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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(REQUEST FOR FILING A PATENT APPLICATION UNDER 37 CFR 1.60, PAGE 2)

9. ☐ New formal drawings are enclosed.
10. ☐ Priority of foreign application number _____, filed on _____ in _____
is claimed under 35 U.S.C. 119(a) - (d).
☐ The certified copy has been filed in prior application number ____ / _____, filed _____.
11. ☒ A preliminary amendment is enclosed.
12. ☒ The prior application is assigned of record to Columbia Manufacturing Corporation
13. ☐ Also enclosed:

14. ☒ The power of attorney in the prior application is to: Charles H. Thomas, Reg.

No. 25,710

- a. ☒ The power of attorney appears in the original papers in the prior application.
- b. ☐ Since the power does not appear in the original papers, a copy of the power in the prior application is enclosed.
- c. ☐ Address all future correspondence to: (May only be completed by applicant, or attorney or agent of record.)

☐ Customer Number

OR

☒ Firm or☒ Individual Name Charles H. ThomasAddress 4201 Long Beach Blvd., Suite 405

Address

City Long BeachState CAZIP 90807-2022Country U.S.A.Telephone 562-595-8422

Fax

562-595-9319

June 3, 1999

Date

Signature

Charles H. Thomas

Typed or printed name

- ☐ Inventor(s)
- ☐ Assignee of complete interest. Certification under 37 CFR 3.73(b) is enclosed.
- ☒ Attorney or agent of record
- ☐ Filed under 37 CFR 1.34(a)
Registration number if acting under 37 CFR 1.34(a) _____.

[Page 2 of 2]

656090775550

**VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(b))--INDEPENDENT INVENTOR**

Docket Number (Optional)

T-2988

Applicant or Patentee: Curtis C. Shoup

Serial or Patent No.: _____

Filed or Issued: _____

Title: METHOD OF FABRICATING SECURITY DOOR AND STRUCTURE THEREOF

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

☒ the specification filed herewith with title as listed above.

☐ the application identified above.

☐ the patent identified above.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

☐ No such person, concern, or organization exists.

☒ Each such person, concern or organization is listed below.

Columbia Manufacturing Corporation
14400 South San Pedro Street
Gardena, California 90248

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Curtis C. Shoup
NAME OF INVENTOR

Curtis C. Shoup
Signature of Inventor

Nov. 14, 1997
Date

NAME OF INVENTOR

Signature of Inventor

Date

NAME OF INVENTOR

Signature of Inventor

Date

666090-11000000

VERIFIED STATEMENT CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) & 1.27(c))--SMALL BUSINESS CONCERN

Docket Number (Optional)

T-2988

Applicant or Patentee: Curtis C. Shoup

Serial or Patent No.: _____

Filed or Issued: _____

Title: METHOD OF FABRICATING SECURITY DOOR AND STRUCTURE THEREOF

I hereby declare that I am

☐ the owner of the small business concern identified below:☒ an official of the small business concern empowered to act on behalf of the concern identified below:NAME OF SMALL BUSINESS CONCERN Columbia Manufacturing CorporationADDRESS OF SMALL BUSINESS CONCERN 14400 South San Pedro StreetGardena, California 90248

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 37 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:

☒ the specification filed herewith with title as listed above.☐ the application identified above.☐ the patent identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights in the invention must file separate verified statements averring to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization having any rights in the invention is listed below:

☐ no such person, concern, or organization exists.☒ each such person, concern or organization is listed below.

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING Curtis C. ShoupTITLE OF PERSON IF OTHER THAN OWNER President and Chief Executive OfficerADDRESS OF PERSON SIGNING 14400 South San Pedro Street, Gardena, CA 90248SIGNATURE Curtis C. ShoupDATE Nov 19, 1997

66E090" TEE2E60

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor: Curtis C. Shoup)
)
Serial No:)
)
Title: METHOD OF FABRICATING) G.A.U
SECURITY DOOR AND)
STRUCTURE THEREOF)
)
Filed:)
)
Examiner:)
)

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents
and Trademarks
Washington, DC 20231

Sir:

IN THE TITLE

At page 1 of the application, please amend the title of the application to read as follows:-

-- METHOD OF FABRICATING SECURITY DOOR --.

IN THE SPECIFICATION

Please insert as the first sentence on page 1 after line 6 the following:

-- The present application is a division of U.S. Application Serial No. 08/976,763
filed November 24,1997, presently pending. --

IN THE CLAIMS

Please cancel Claims 18 through 20 as indicated in the enclosed request for filing a patent application under 37 C.F.R. § 1.60.

REMARKS

The title of this application has been amended to more accurately reflect the nature of the subject matter claimed therein.

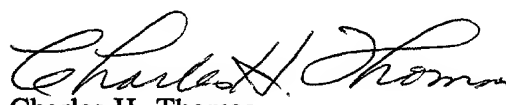
Applicant has amended the specification to designate that the present application is a division of U.S. Application Serial No. 08/976,763 in order to claim the priority of the filing date thereof as provided by M.P.E.P. § 201.11 and 35 U.S.C. § 120.

Original claims 18 - 20 in the application have been cancelled.

It is not believed any fee is due in connection with this preliminary amendment. However, authorization is hereby given to charge any underpayment and credit any overpayment of fees in connection with the filing of this application and the present amendment to Patent Office Deposit Account No. 032035.

Dated: June 3, 1999

Respectfully submitted,


Charles H. Thomas
Registration No. 25,710

Charles H. Thomas
CISLO & THOMAS LLP
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

METHOD OF FABRICATING SECURITY DOOR
AND STRUCTURE THEREOF

SPECIFICATION

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a security door and a method of manufacturing a security door.

Description of the Prior Art

With the rise of anxiety concerning both personal safety and the security of property, the use of security doors has become increasingly commonplace.

Conventional security doors are formed of rectangular frames of heavy metal tubing, often drawn and rolled steel having a thickness of about 0.090 inches. The steel tubing is formed to create upright stile members and upper and lower transverse rail members extending between the stile members. To create security, a grid of metal bars is provided across the rectangular opening defined between the stile and rail members. Some of these metal bars extend parallel to the stiles and are anchored to the transverse rail members at the top and bottom of the door. Other metal security bars are oriented perpendicular to the door stiles and are secured thereto.

In some cases additional decorative and angular metal bars are provided as an adjunct to the rectilinear grid that functions to provide the door with a high level of security. Quite often a security door is also provided with a screen mesh to exclude insects and rodents. It is the metal grillwork, however, which provides security from unauthorized entry and which affords protection against burglary and home invasions. Security doors are mounted in gate openings or in buildings in surrounding metal frames that are firmly secured in the doorway to be protected.

The conventional fabrication of security doors is both expensive and time consuming. Specifically, the metal security bars forming the rectilinear grillwork are at present secured to the elements or segments of the surrounding rectangular frame forming the door by means of arc welding. The process of arc welding is expensive and time consuming. Furthermore, arc welding requires a considerable amount of skill to create a sound weld. Therefore, it is necessary to employ factory workers

with a high level of welding skill and experience in order to create the arc welds necessary in the fabrication of security doors. As an alternative to manual welding, robotic welding machines can be used. However, such robotic welding machines require major capital investments and drastically increase the overhead expenses necessary for security door fabrication.

SUMMARY OF THE INVENTION

A primary object of the present invention is to provide a system for fabricating security doors which avoids the need for the skill and/or expense involved in attaching security bars into a surrounding frame of a security door by arc welding, but which produces a security door having the strength and rigidity previously obtained only through the use of arc welding. According to the present invention the structural strength and rigidity necessary for a security door is achieved by forming the metal frame of the door with hollow segments in which security bar receiving apertures have been defined, and attaching the bars of the security door to the surrounding frame with spot welds. The structure of the door is such that portions of the frame reside in a face-to-face disposition with surfaces of the bars. Such a face-to-face relationship between metal surfaces is necessary in order for the process of spot welding to be effective.

Unlike the process of arc welding, spot welding does not require the use of a high temperature torch nor the use of any flux which must be melted at the same time that the metal parts to be joined are at just the right temperature to achieve a secure

weld. In the process of spot welding a pair of copper welding tips or electrodes are brought from opposite sides into contact with mutually facing metal parts to be joined together. A brief, high amperage electrical current is then passed through the electrodes and through the juxtaposed metal parts sandwiched therebetween. The metal surfaces melt together in a small area through which the electric current passes at the interface between the metal parts to be joined. The resulting spot weld is extremely strong, since it is created by an actual melting together of the metal surfaces to be joined. Nevertheless, operation of a spot welding machine requires no particular skill.

Another object of the invention is to create a security door frame in which the corners of the intersecting members forming the frame are rigidly joined together. In conventional practice the stiles and rails of security doors are typically formed of drawn and rolled steel configured into a tube that is seam welded utilizing an arc welding process. While the tubing forming the stiles and rails is originally formed in a circular shape, through processing the tubing is reshaped to a square or rectangular, cross-sectional configuration. The sections of the tubing forming the stiles and rails are then arc welded at their ends to form a door frame having a rectangular perimeter. The steel bars are then secured to the stiles and rails by an arc welding process.

By utilizing a spot welding process according to the present invention in the fabrication of a security door, it is possible to form the stiles and rails of the door

frame from sheet metal using a roll-forming process. This allows a thinner gage of steel to be used in the construction of the stiles and rails, but the door frame is even stronger than conventional security door frames because stiffening ribs or flanges can be roll-formed into the sheet metal. As a consequence, even though the frame members forming the door frame of the present invention are lighter in weight than conventional door frame members of the same size, the door frame members of the present invention have a stronger bending moment than their conventional counterparts.

It would not be possible to fasten the bars of a security door to roll-formed sheet metal stile and rail members using conventional methods of security door fabrication, since any attempt to arc weld the bars to the sheet metal frame members would cause holes to be burnt through the sheet metal stock of the frame members. However, by utilizing the technique of spot welding rather than arc welding it is possible to secure security bars to roll-formed sheet metal stile and rail members to form a security door that is lighter in weight, stronger, and cheaper to manufacture than conventional security doors.

In one broad aspect the invention may be considered to be an improvement in a method of fabricating a metal security door having a frame formed with a pair of hollow, upright stile members, upper and lower hollow transverse rail members extending between the stile members, and security bars extending between at least some of the stile and rail members. The improvement of the invention resides in the

step of spot welding the security bars to at least some of the stile and rail members.

Preferably, the hollow stile and rail frame segment members are roll-formed from a single elongated sheet of steel. A security bar attachment flange is roll formed on each of the hollow stile and rail segment members. The security bar attachment flanges are formed by rolling the opposing longitudinal edges of the sheet metal strip together and turning one edge over the other. The attachment flanges project inwardly within the rectangle formed by the stile and rail members and lie in a common plane.

Security bar receiving openings are preferably defined in each of the perimeter stile and rail segment members so as to reside proximate to the security bar attachment flanges thereof on one side of a common plane. The security bar receiving openings in each adjacent stile and rail segment member lie on the opposite side of the same plane. As a consequence the security bars extending between and spot welded to the stiles and the security bars extending between and spot welded to the rails do not interfere with each other.

Preferably also, at least some of the perimeter segment stile and rail members are formed with pairs of corner tabs projecting from their ends. These corner tabs are formed by die cutting the single strip of sheet metal with longitudinally extending tabs at mitered corners between adjacent segment members. When the roll-formed sheet metal structure is bent at right angles between the perimeter segment stile and rail members, the corner securing tabs projecting from the segment members upon

which they are formed are disposed in juxtaposition and in contact with the ends of the immediately adjacent segment members. The securing tabs are then spot welded to the opposing ends of the segment members located immediately adjacent thereto.

5 The pairs of corner securing tabs can either be formed as longitudinal extensions from both ends of the upper and lower rail members, longitudinal extensions from both ends of the stile members, or longitudinal extensions from one end of each of the members. The corner securing tabs are arranged in pairs so as to stiffen both the interior and exterior faces of the door frame.

10 In another aspect the present invention may be considered to be a method of fabricating a metal security door. The steps of the method of the invention comprise: forming four hollow door perimeter segment members so as to define a plurality of security bar receiving openings in each of the perimeter segment members; positioning a plurality of metal security bars to project through security bar receiving openings and into the hollow perimeter segment members so that the ends of the metal security bars terminate within the perimeter segment members and the perimeter segment members together form a rectangle; and spot welding the ends of the metal security bars to the perimeter segment members within which they terminate.

15 In another broad aspect the invention may be considered to be a security door comprising: a mutually parallel pair of hollow, roll-formed sheet metal upright stiles having opposing extremities; mutually parallel, hollow, roll-formed sheet metal upper and lower transverse rails connected to the extremities of the upright stiles and

oriented perpendicular thereto; security bars extending between and spot welded to the upright stiles; and security bars extending between and spot welded to the rails.

Preferably the stiles and rails are formed with security bar receiving apertures therein and bar attachment flanges thereon. The security bars preferably extend through the security bar receiving apertures into the stiles and rails. The security bars are spot welded to the stiles and rails at the attachment flanges. Corner securing tabs preferably extend from selected ones of the stiles and rails, and are spot welded to other of the stiles and rails.

The invention may be described with greater clarity and particularity by reference to the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front elevational view of a security door constructed according to the invention.

Fig. 2 is a plan detail of a section of the sheet metal strip utilized to form the door frame of Fig. 1.

Fig. 3 is a transverse sectional view taken along the lines 3-3 of Fig. 1.

Fig. 4 is a sectional detail taken along the lines 4-4 of Fig. 1 showing the manner in which the security bars are spot welded to the frame of the security door of the invention.

Fig. 5 is a elevational detail showing the transition between two of the hollow, roll-formed door frame segment members at an intermediate stage in the manufacture

of the door frame of Fig. 1.

Fig. 6 is an edge view of the portions of the door frame segment member shown in Fig. 5 being spot welded together once they have been moved into their final assembly positions.

Fig. 7 is a sectional detail taken along the lines 7-7 of Fig. 6.

DESCRIPTION OF THE EMBODIMENT AND IMPLEMENTATION OF THE METHOD

Fig. 1 illustrates a security door 10 fabricated according to the invention and mounted within a frame 12 in the manner in which the security door 10 is installed in a door opening in a building. The security door 10 is comprised of a mutually parallel pair of hollow, roll-formed sheet metal upright stiles 14 and 16 each having opposing extremities 18 and 20. The security door 10 also is formed with a hollow, roll-formed sheet metal upper transverse rail 22 and a corresponding lower transverse rail 24 of the same construction. The upper and lower rails 22 and 24 are connected to the extremities 18 and 20 of the upright stiles 14 and 16 and are oriented perpendicular thereto. Together the stiles 14 and 16 and the upper and lower rails 22 and 24 form a metal door perimeter frame 30. Steel security bars 26 one-half inch square extend between and are spot welded to the upright stiles 14 and 16. Other steel security bars 28 also one-half inch square extend between and are spot welded to the rails 22 and 24.

The door frame 30 preferably is fabricated from a single, elongated strip of

sheet metal 32 which is initially flat, as depicted in Fig. 2. However, four individual lineals could just as easily be used in the construction if desired. The elongated metal strip 32 is preferably formed of sheet steel about 0.025 inches in thickness. The elongated sheet metal strip 32 has opposing longitudinal edges 34 and 36 in which indentations 38 are die cut to form mitered corners where the stiles 14 and 16 meet the rails 22 and 24.

In the embodiment illustrated the die cut indentations 38 are configured to form a pair of corner securing tabs 40 at both ends of each of the transverse rail members 22 and 24. The corner securing tabs 40 project longitudinally toward the portions of the sheet metal strip 32 that form the ends 18 and 20 of the stiles 14 and 16.

Also, and while the sheet metal strip 32 is still in a flat condition, it is die cut to form security bar receiving apertures 42 for receiving the vertical bars 28 and 42a for receiving the horizontal bars 26 in the portions in the strip 32 that are ultimately respectively formed into the hollow rail and stile segments. Furthermore, while the elongated sheet metal strip 32 is still in a flat condition, it is initially die cut to form spot welding electrode access openings 44 in those portions of its structure that ultimately form the opposing ends 18 and 20 of each of the stile members 14 and 16. The initial die cutting of the sheet metal strip 32 ultimately creates a spot welding tip access aperture 44 in the hollow members forming the door frame 30 at each of the corners thereof.

Once the elongated metal strip 32 has been die cut with the indentations and

openings as illustrated in Fig. 2, it is roll formed to create the hollow frame segment stile and rail members 14, 16, 22, and 24 substantially in the manner described in U.S. Patent No. 5,018,263, which is incorporated herein by reference. That is, the sheet metal strip 32 is passed through a series of rollers that progressively shape the strip 32 into the hollow, generally rectangular, cross-sectional configuration depicted in Fig. 4. While Fig. 4 shows a cross-sectional view through only the stile 14, the cross-sectional configuration of both of the stiles 14 and 16 and the transverse upper and lower rails 22 and 24 is identical.

As shown in Fig. 4, the hollow segment members forming the frame 30 are roll formed to define a pair of outwardly directed legs or ribs 48 created by bending the structure of the sheet metal strip 32 sharply back on itself. These legs 48 project outwardly from a web 49 formed therebetween and provide the stiles 14 and 16 and the rails 22 and 24 of the frame 30 with lateral strength that creates a stronger bending moment than is achieved in conventional security door frame construction. Even though the structural members of the frame 30 are formed of a thinner gauge of metal than the drawn and rolled steel tubing used to form conventional security doors, which is typically about 0.90 inches, they are stronger than their conventional counterparts. Moreover, the use of a thinner gauge of metal reduces the cost of materials required in the fabrication of the security door quite substantially. Furthermore, the cost of fabrication is greatly reduced since the sheet metal strip 32 is of a thickness that can be roll-formed. The expensive and time consuming process of

seam welding is thus avoided.

In the roll-forming process the longitudinal edges 32 and 36 of the sheet metal strip 32 are progressively brought together such that the marginal region of the strip 32 proximate the edge 36 is wrapped over the edge 34. The edges 34 and 36 are thereby rolled together and the edge 36 is turned over the edge 34 to form security bar attachment flanges 50 on both of the stiles 14 and 16 and on both the upper rail 22 and the lower rail 24. The attachment flanges 50 all project inwardly from the inwardly facing surfaces 51 of the stiles 14 and 16 and the rails 22 and 24.

The inwardly directed attachment flanges 50 are all essentially flat and reside in a common plane 52 as is evident in Fig. 4. The security bar receiving openings 42a in the stiles 14 and 16 lie on one side of this common plane 52, while the security bar receiving openings 42a in the upper and lower rails 22 and 24 lie on the opposite side of the plane 52. All of the security bar receiving openings 42 and 42a lie immediately adjacent to the attachment flanges 50 on the frame segment members in which they are formed.

Once the sheet metal strip 32 has been roll formed to create the stiles 14 and 16 and the upper rail 22 and the lower rail 24, the structure of the frame is bent at its corners. For example, the stile 14 may first be bent upwardly at its lower end 20 as indicated in phantom at 14' in Fig. 5 to assume an orientation perpendicular to the lower rail 24. The lower ends of the security bars 28 are thereupon inserted into the security bar receiving openings 42 in the lower rail 24. The left-hand ends of the

security bars 26, as viewed in Fig. 1, are inserted into the security bar receiving openings 42a in the stile 14.

The upper rail 22 is then bent over at its demarcation from the upper end 18 of the stile 14 formed by a pair of miter cuts 38 to a perpendicular orientation relative to the stile 14. The stile 16 is likewise bent into a perpendicular orientation relative to the upper transverse rail 22, also at miter cuts 38 that delineate the stile 16 from the upper rail 22.

The security bars 28 are longer than the distance between the inwardly facing surfaces 51 of the upper and lower rails 22 and 24 but do not extend all the way to the webs 49 formed between the pair of legs 48 of the rail members 22 and 24. Consequently, as the upper rail 22 is brought into position perpendicular to the stile 14, the security bars 28 can be temporarily advanced into the hollow confines of the lower rail 24 so as not to obstruct movement of the upper rail member 22 into its horizontal orientation perpendicular to the stile 16. Thereafter, the security bars 28 are moved back upwardly so that the upper ends thereof are inserted into the security bar receiving openings 42 in the interiorly facing surface 51 of the upper rail 22. The opposite ends of the vertical security bars 28 thereby project into the hollow enclosures formed within both the upper and lower rails 22 and 24.

Similarly, the horizontal, transverse security bars 26 are longer than the distance of separation between the surfaces 51 of the stiles 14 and 16 in which the security bar openings 42a are formed, but short enough so that they can be moved in

reciprocal fashion slightly to allow the stile 16 to be brought into position perpendicular to the transverse rails 22 and 24. The horizontal security bars 26 are thereupon moved slightly to the right as viewed in Fig. 1 so as to project through the security bar receiving openings 42a in both of the stiles 14 and 16 and into the hollow enclosures therewithin. As is evident in Fig. 4, the security bars 26 and 28 all pass closely adjacent to, and indeed reside in contact with, the attachment flanges 50 on opposite sides of the plane 52 from each other.

As also illustrated Fig. 4, copper spot welding electrodes or tips 54 and 56 are thereupon moved reciprocally toward each other and into respective contact with the attachment flange 50 of the stiles 14 and 16 and the ends of the transverse security bars 26 proximate their extremities. A high amperage electrical current is then passed between the electrodes 54 and 56 thereby creating a spot weld at the interface where the surfaces of the security bars 26 contact the attachment flanges 50 of the stiles 14 and 16. The security bars 26 thereby reside in contact with and are attached by spot welding to the flanges 50 of the stiles 14 and 16. The ends of the vertical security bars 28 are secured by spot welding to the attachment flanges 50 of the transverse rail members 22 and 24 in the same manner.

As illustrated, the security bars 28 that extend between and into the transverse rail members 22 and 24 are spot welded to the attachment flanges 50 thereof on the opposite side of the plane 52 from the security bars 26. The security bars 26 and 28 thereby reside in contact with and are spot welded to their respective attachment

flanges 50 on opposite sides of the plane 52 and from each other.

As illustrated in Figs. 5, 6, and 7, the corner securing tabs 40 projecting from both ends of the rail members 22 and 24 overlap and reside in contact with the interior surfaces 58 of the inwardly and outwardly facing side walls 60 and 62 of the stiles 14 and 16. To rigidify the corners of the frame 30, the corner fastener tabs 40 are spot welded to the surfaces 58 of the side walls 60 and 62 of the stiles 14 and 16 with which they lie in contact. This is done by inserting internal spot welding electrodes 64 into the electrode access openings 44 defined in the webs 49 of the stiles 14 and 16.

The internal spot welding electrodes 64 are copper, disc-shaped structures mounted upon the ends of reciprocal electrode posts 66. In preparation for spot welding the corners of the door frame 30, the internal spot welding electrodes 64 are advanced laterally in a direction perpendicular to the orientation of the stiles 14 and 16 and parallel to the orientation of the rails 22 and 24 to the position depicted in Figs. 6 and 7. Since an electrode access opening 44 is defined in each of the opposing ends 18 and 20 of each of the stiles 14 and 16, there is an electrode access opening 44 located at each corner of the rectangular door frame 30.

With the internal electrodes 64 in position as depicted in Figs. 6 and 7, external electrodes 68 and 70 are sequentially brought into contact with the side walls 60 and 62, respectively, of the stiles 14 and 16. The external electrodes 68 at each corner of the frame 30 are simultaneously brought into contact with the side walls 60

of the stile members 14 and 16 with the internal spot welding electrodes 64 in position at each of the four corners of the frame 30 as illustrated in Fig. 6. A high amperage electrical current is then passed between the electrodes 64 and 68, thereby spot welding one corner fastening tab 40 in each pair of fastening tabs to the stile side walls 60.

The external electrodes 68 are then withdrawn from contact with the side walls 60 of the stiles 14 and 16 and the external electrodes 70 are thereupon brought into contact with the side walls 62 thereof. An electrical current is again created and passed between the external electrodes 70 and internal electrodes 64, thereby welding the other of the corner fastening tabs 40 in each pair to the side walls 62 of the stile members 14 and 16. Following this step the internal electrodes 64 are withdrawn back through the electrode access openings 44. The fabrication process in the manufacture of the security door 10 is thereupon complete.

The present invention provides a unique system for creating a security door 10 of extremely sound construction far more quickly and economically than has heretofore been possible. Furthermore, the cost of materials is significantly reduced compared to the material costs incurred in the conventional manufacture of security doors.

A very important feature of the invention is that it is totally unnecessary to employ any arc welding step in the security door fabrication process. This reduces the labor costs or use of costly robotics in the manufacturing process significantly,

and also reduces the incidence of bad or misplaced welds, which often occur in products produced by arc welding.

Undoubtedly, numerous variations and modifications of the invention will become readily apparent to those familiar with the structure and fabrication of security doors. For example, it is readily apparent that a security door produced according to the invention may be provided with conventional screen material to exclude insects but still permit ventilation. Also, while the corner fastening tabs 40 in the embodiment depicted are formed at the ends of the rail members 22 and 24, the miter cuts could be altered so that the corner fastening tabs project from both ends of the stiles 14 and 16 instead, or from a single end of each of the stile and rail members. Also, while in the embodiment illustrated all of the stile and rail members were formed from a single elongated strip of sheet metal, the different segments of the frame member could also be formed from separate strips of sheet metal, since the corners of the door frame where the stiles and rails meet are spot welded together.

Other modifications of the invention are also possible. Accordingly, the scope of the invention should not be construed as limited to the specific embodiment illustrated or manner of implementation of the method described.

I CLAIM

1. In a method of fabricating a metal security door having a frame formed with a pair of hollow, upright stile members, upper and lower hollow transverse rail members extending between said stile members, and security bars extending between
5 at least some of said stile and rail members, the improvement comprising spot welding said security bars to said at least some of said stile and rail members.

2. A method according to Claim 1 including a plurality of security bars extending between and into said stile members and a plurality of security bars extending between and into said rail members, and further comprising forming said stile members and said transverse rail members with flat, inwardly directed attachment flanges across which said security bars pass, wherein said security bars
10 reside in contact with and are spot welded to said attachment flanges.

3. A method according to Claim 2 further comprising forming and positioning said attachment flanges to reside in a common plane and spot welding said security bars that extend into and between said stile members to said attachment flanges thereof on one side of said common plane and spot welding said security bars
5 that extend between and into said transverse rail members to said attachment flanges thereof on the opposite side of said common plane.

4. A method according to Claim 2 further comprising first punching security bar receiving openings in at least one flat sheet metal strip and cutting said at least one flat sheet metal strip to form corner securing tabs thereon, roll forming said

5 at least one flat sheet metal strip to form said hollow members at least some of which have pairs of said corner securing tabs projecting therefrom, positioning said hollow members so that said frame has a rectangular configuration forming four corners in which said transverse rail members meet said stile members with a pair of said corner securing tabs at each of said corners, and spot welding said corner securing tabs on said at least some hollow members to other of said hollow members adjacent thereto at each of said corners.

5. A method according to Claim 4 further comprising forming all of said hollow members from a single flat, sheet metal strip.

6. A method according to Claim 5 further comprising initially cutting spot welding tip access apertures in said single, flat, sheet metal strip, thereby creating at least one spot welding tip access aperture in said hollow members at each of said corners, and spot welding said corner securing tabs to said other of said hollow members adjacent thereto by inserting internal spot welding tips into said spot welding tip access apertures so as to contact said corner securing tabs within said hollow members, bringing external spot welding tips into external contact with said hollow members and passing electric currents between said internal and said external spot welding tips to spot weld said hollow members together at each of said corners.

7. A method of fabricating a metal security door comprising:

forming four hollow metal door perimeter segment members so as to define a plurality of security bar receiving openings in each of said perimeter

segment members,

5 positioning a plurality of metal security bars to project through
said security bar receiving openings and into said hollow perimeter segment members
so that said ends of said metal security bars terminate within said perimeter segment
members and said perimeter segment members together form a rectangle, and

 spot welding said ends of said metal security bars to said
perimeter segment members within which they terminate.

8. A method according to Claim 7 further comprising roll forming said
hollow segment members so as to create a security bar attachment flange on each of
said hollow segment members, whereby said attachment flanges all project inwardly
within said rectangle and lie in a common plane, and whereby said security bar
5 receiving openings in each of said perimeter segment members reside proximate to
said security bar attachment flange thereof on one side of said common plane while
said security bar receiving openings in each adjacent perimeter segment member lie
on the opposite side of said common plane.

9. A method according to Claim 8 further comprising forming said hollow
segment members from at least one elongated sheet of metal having opposing
longitudinal edges, rolling said edges together and turning one edge over the other to
form said security bar attachment flanges.

10. A method according to Claim 9 further comprising forming all of said
hollow segment members from a single, elongated sheet of metal.

11. A method according to Claim 7 further comprising forming at least some of said perimeter segment members with corner tabs projecting from their ends and spot welding said corner tabs to other of said perimeter segment members located adjacent thereto.

12. A method according to Claim 11 further comprising cutting electrode access openings in at least some of said perimeter segment members so that there is an electrode access opening at each corner of said rectangle, inserting internal spot welding electrodes into said electrode access openings, pressing external spot welding electrodes against said perimeter segment members to hold said corner tabs in contact with said other of said perimeter segment members located adjacent thereto, and passing electric current between said internal and said external electrodes to spot weld said corner tabs to said other of said perimeter segment members located adjacent thereto at each of said corners of said rectangle.

13. A method of fabricating a security door comprising:

forming a metal door frame to define a pair of hollow stile frame members and upper and lower hollow transverse rail frame members so that each of said frame members has an inner face with an attachment flange projecting therefrom and security bar receiving apertures defined in said inner faces of said frame members,

positioning a plurality of metal security bars relative to said hollow frame members so that the ends of said security bars project through said

security bar receiving apertures and into said hollow frame members and so that said security bars pass over and reside in contact with said attachment flanges, and

spot welding said security bars to said attachment flanges so as to permanently secure said security bars to said metal door frame.

14. A method according to Claim 13 further comprising roll forming said metal door frame from a single elongated strip of sheet metal and cutting indentations into said strip to form mitered corners between adjacent frame members.

15. A method according to Claim 13 further comprising the steps of:

cutting an elongated continuous flat sheet metal strip to form mutually parallel, longitudinal edges thereon;

cutting mitered corners and pairs of opposing corner tabs in said longitudinal edges of said strip;

rolling said flat sheet metal strip to form a structure having a hollow cross section;

crimping said longitudinal edges of said strip together between said mitered corners to form said stile frame members and said transverse rail frame members;

longitudinally bending said rolled sheet metal strip at right angles between said frame members to bring said stile frame members into perpendicular alignment relative to said rail frame members and so that said pairs of corner tabs project alongside surfaces of said frame members adjacent thereto at said

mitered corners; and

spot welding said pairs of corner tabs to said frame members adjacent thereto to thereby secure said stile frame members in perpendicular alignment relative to said upper and lower transverse rail frame members.

16. A method according to Claim 15 further comprising cutting spot welding electrode access openings into said sheet metal strip, inserting internal spot welding electrodes into said electrode access openings prior to spot welding said pairs of corner tabs, and withdrawing said internal electrodes from said electrode access openings after spot welding said pairs of corner tabs.

17. A method according to Claim 16 further comprising sequentially spot welding each of said corner tabs in each of said pairs.

18. A security door comprising:

a mutually parallel pair of hollow, roll-formed sheet metal upright stiles having opposing extremities,

mutually parallel, hollow, roll-formed sheet metal upper and lower transverse rails connected to said extremities of said upright stiles and oriented perpendicular thereto,

security bars extending between and spot welded to said upright stiles, and

security bars extending between and spot welded to said rails.

19. A security door according to Claim 18 wherein said stiles and rails are

formed with security bar receiving apertures therein and security bar attachment flanges thereon and said security bars extend through said security bar receiving apertures and into said stiles and rails and are spot welded to said stiles and rails at said attachment flanges.

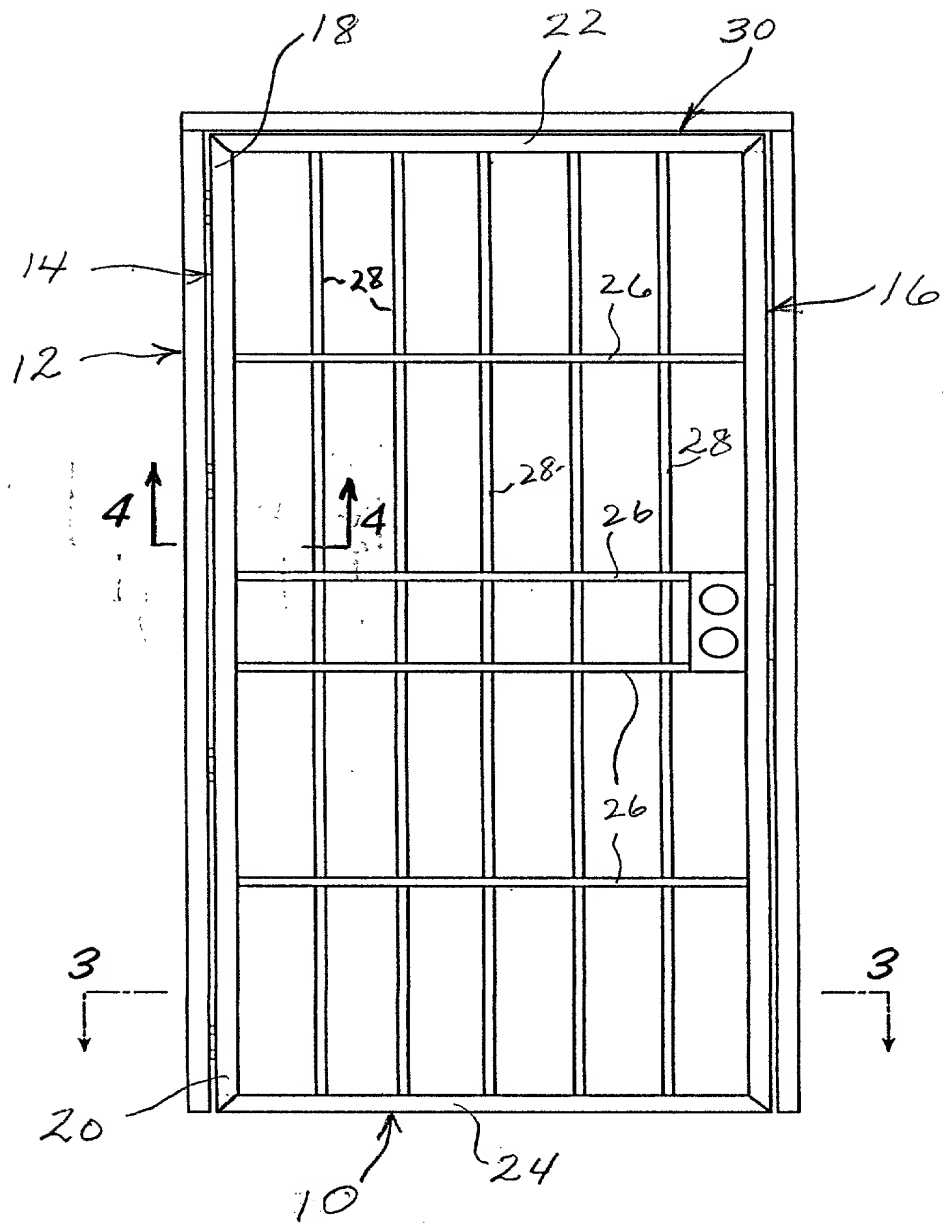
20. A security door according to Claim 19 further comprising corner securing tabs extending from selected ones of said stiles and rails and which are spot welded to others of said stiles and rails.

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ABSTRACT

A security door for a gate or building opening is formed of a metal frame that defines a pair of hollow stile frame members and upper and lower hollow transverse rail frame members. Each of the frame members has an inner face with an attachment flange projecting therefrom. Security receiving apertures are defined in the inner faces of the frame members. In the fabrication of the door a plurality of metal security bars are positioned relative to the hollow frame member so that the ends of the security bars project through the security bar receiving apertures and into the hollow frame members. The security bars pass over and reside in contact with the attachment flanges. The security bars are spot welded to the attachment flanges so as to permanently secure them to the door frame. Also, the frame itself is preferably formed from a single, elongated strip of metal that is roll formed and then bent at mitered corner cuts to create and delineate the stile and rail members. Corner fastening tabs are preferably formed on at least some of these members so as to reside in contact with the ends of other of the frame members located immediately adjacent thereto. The fastening tabs are secured by spot welding to the adjacent members which they contact.

FIG. 1



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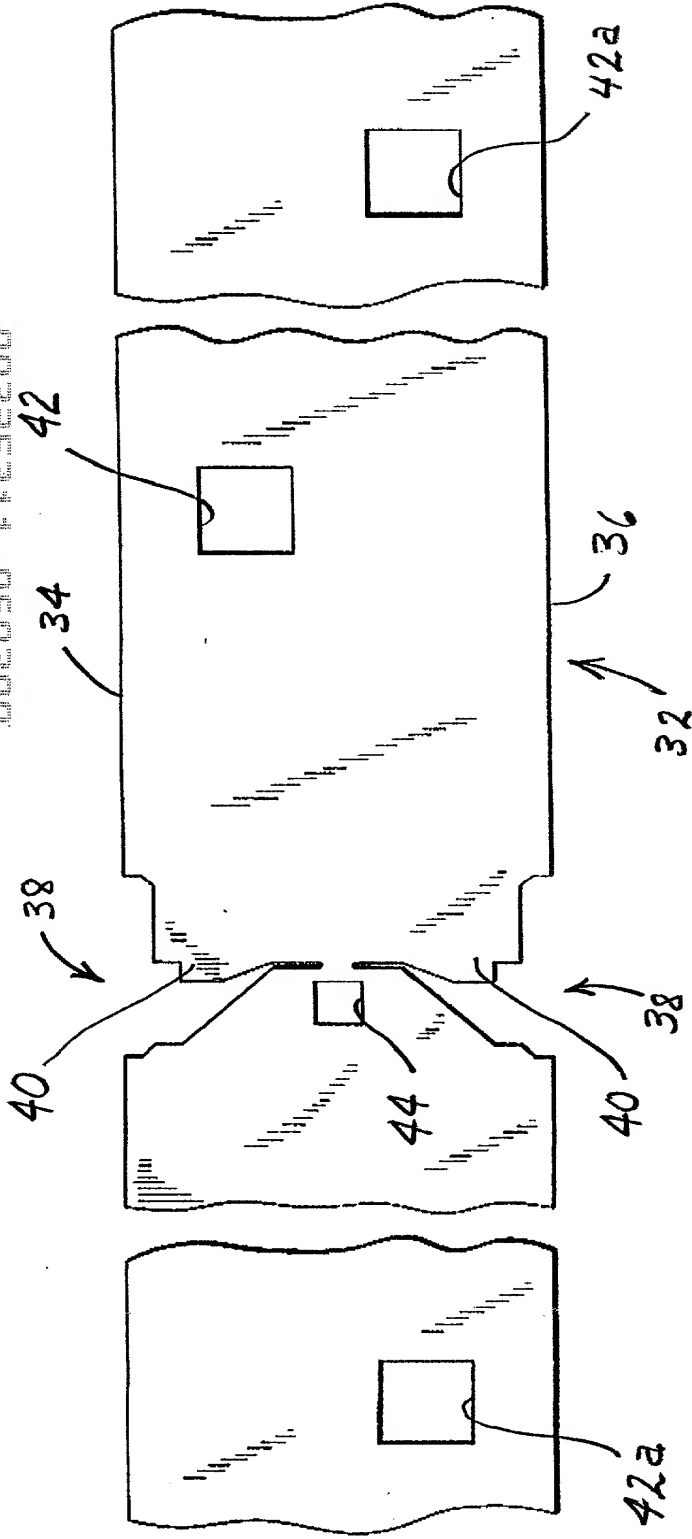


FIG. 2

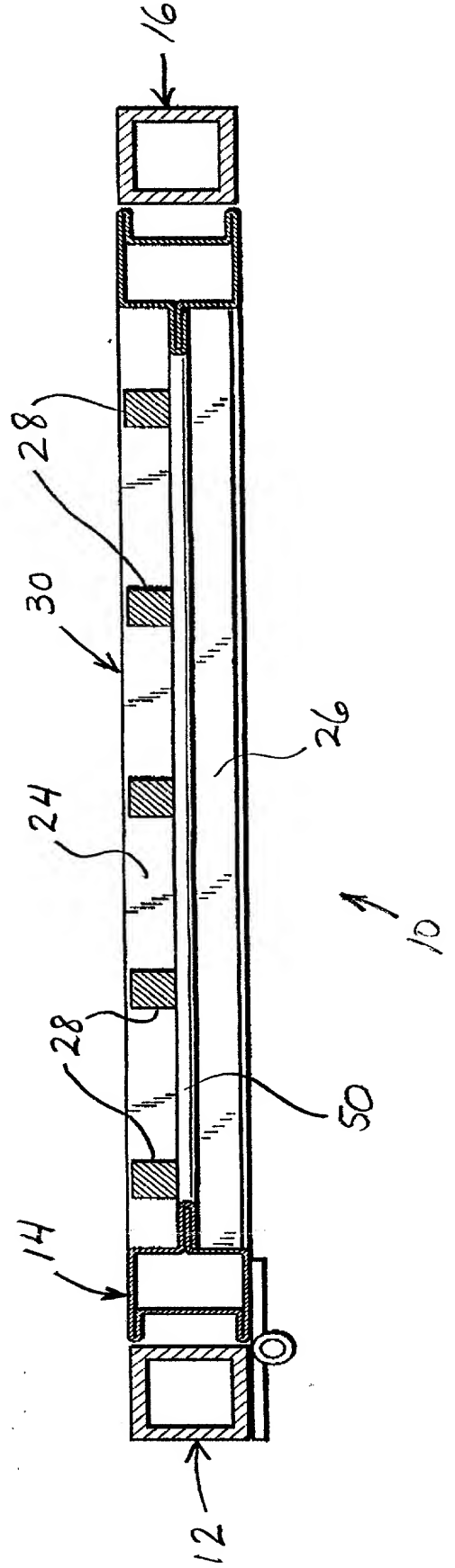


FIG. 3

FIG. 4

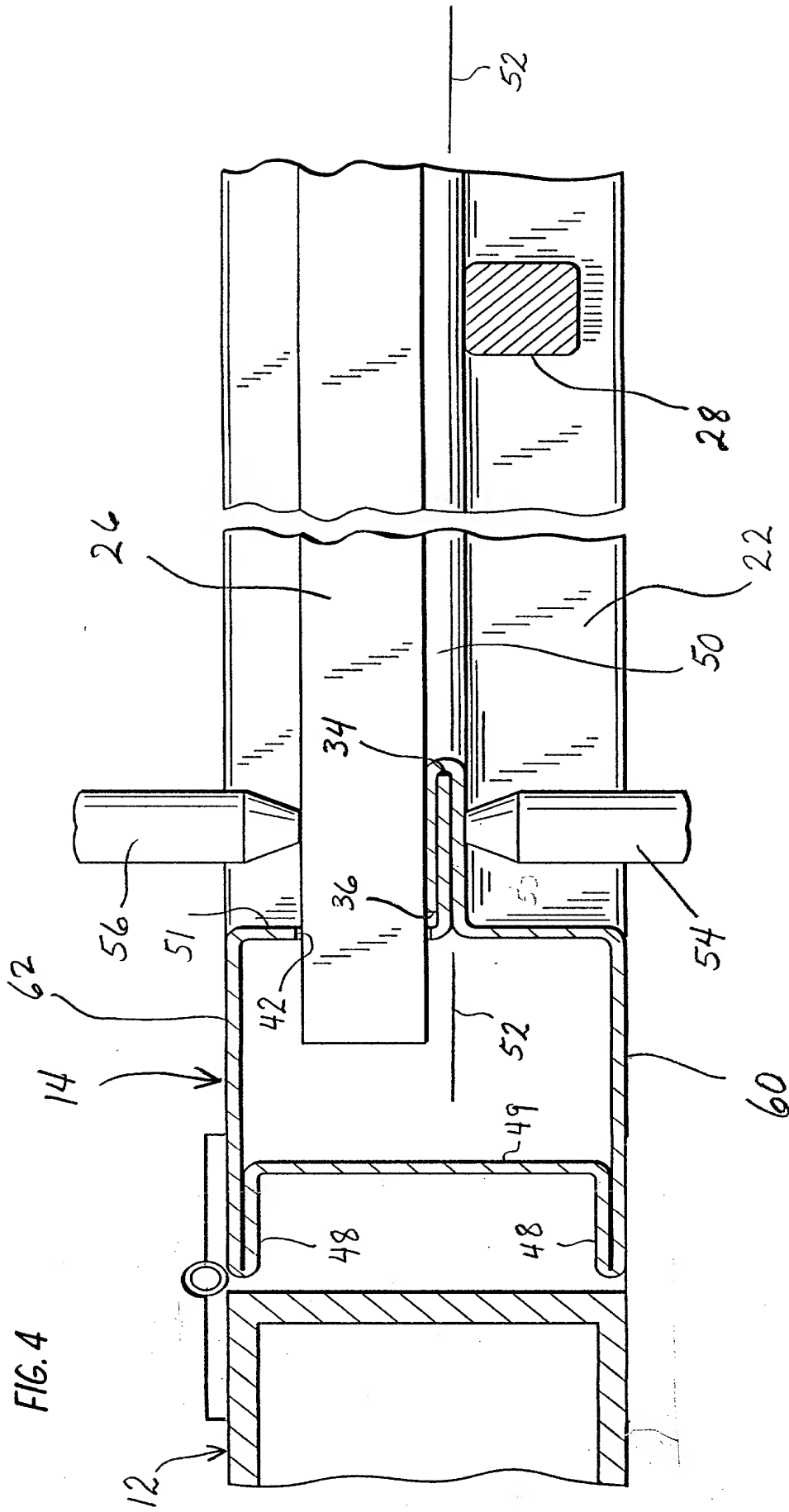


FIG. 5

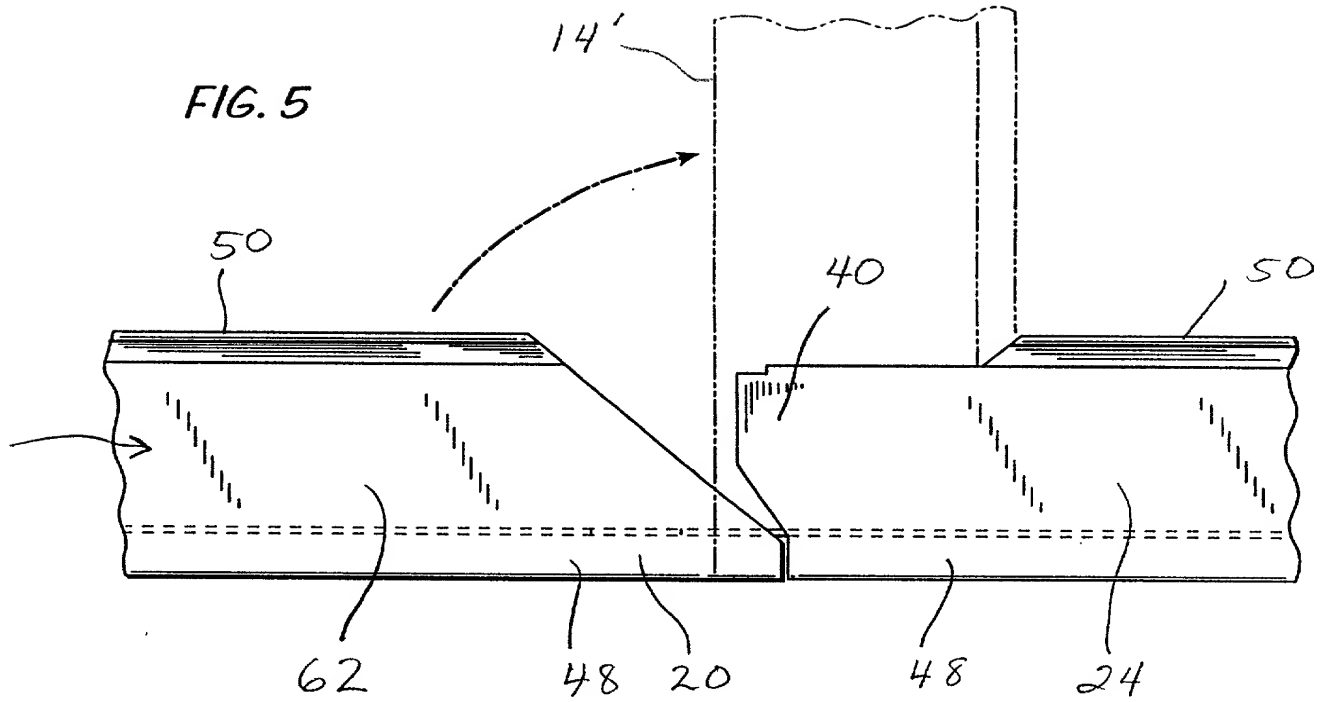


FIG. 6

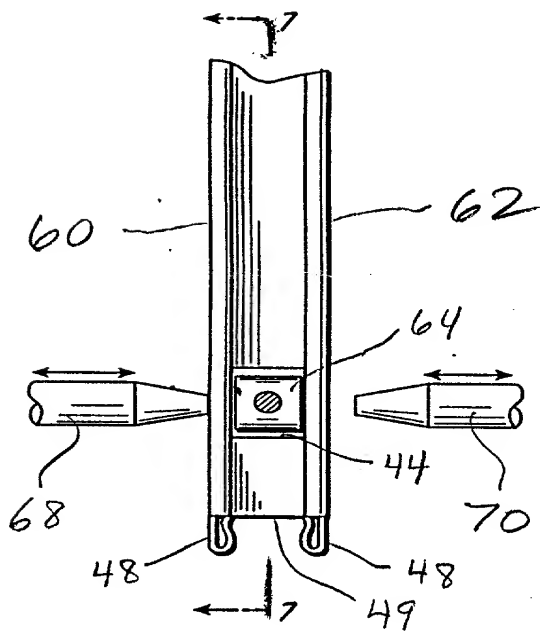
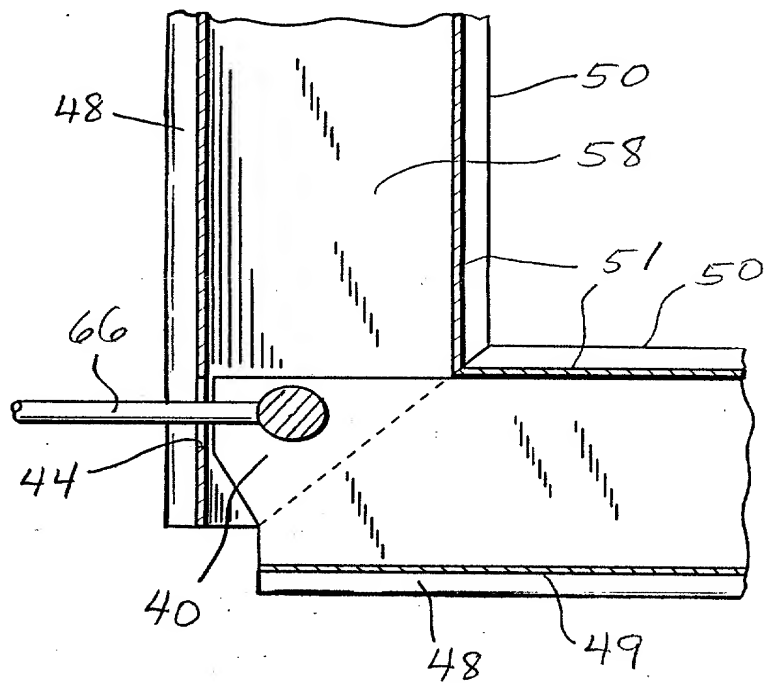


FIG. 7



Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD OF FABRICATING SECURITY DOOR AND STRUCTURE THEREOF
the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as

Application Serial No. _____

and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
_____ (Number)	_____ (Country)	_____ (Day-Month/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Day-Month/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Day-Month/Year Filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

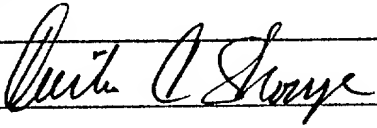
(Status)
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

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(Supply similar information and signature for third and subsequent joint inventors.)

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